

## ABSTRACT

The present invention is directed to a locomotive comprising energy storage units, such as batteries, a prime energy source, such as a diesel engine, and an energy conversion device, such as a generator. The locomotive comprises one or more of the following features: a separate chopper circuit for each traction motor; energy storage units that can be  
5 switched from parallel to series electrical connections, an fluid-activated anti-lock brake system, a controller operable to control separately and independently each axle/traction motor, and a controller operable to control automatically a speed of the locomotive. The present invention includes an integrated system for monitoring, controlling and optimizing  
10 an electrically powered locomotive using a combination of sensors and software to provide feedback that optimizes power train efficiency and individual drive axle performance for a locomotive that utilizes one of several possible electrical energy storage systems to provide the tractive power. The net result is a locomotive that has an integrated system of control over all aspects of the locomotive power train including control over individual drive axles,  
15 especially during acceleration, braking and non-synchronous wheel slip.